AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for ~~comparing~~ recognizing a media entity from a media sample ~~and a media file~~, comprising:

computing a set of sample fingerprints, each sample fingerprint characterizing a particular ~~location~~ sample landmark within said media sample;

obtaining a set of file fingerprints, each file fingerprint characterizing ~~at least one~~ a particular file ~~location~~ landmark within ~~said~~ a media ~~file~~ entity to be identified;

generating correspondences between ~~said particular locations of~~ said ~~media~~ sample landmarks and said obtained file ~~locations of said media file~~ landmarks, wherein corresponding ~~locations~~ landmarks have equivalent fingerprints; and

identifying said media ~~sample and said media file~~ entity if a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related.

2. (Currently amended) The method of claim 1 wherein said ~~particular locations within said media~~ sample landmarks are computed in dependence on said media sample.

3. (Currently amended) The method of claim 1 wherein said each sample fingerprint represents one or more features of said media sample at or near said particular ~~location~~ sample landmark.

4. (Original) The method of claim 1 wherein said sample fingerprints and said file fingerprints have numerical values.

5. (Original) The method of claim 1 wherein values of said sample fingerprints specify a method for computing said sample fingerprints.

6. (Original) The method of claim 1 wherein said media sample is an audio sample.

7. (Currently amended) The method of claim 6 wherein said ~~particular locations~~ sample landmarks are timepoints within said audio sample.

8. (Original) The method of claim 7 wherein said timepoints occur at local maxima of spectral Lp norms of said audio sample.

9. (Original) The method of claim 6 wherein said sample fingerprints are computed from a frequency analysis of said audio sample.

10. (Original) The method of claim 6 wherein said sample fingerprints are selected from the group consisting of spectral slice fingerprints, LPC coefficients, and cepstral coefficients.

11. (Original) The method of claim 6 wherein said sample fingerprints are computed from a spectrogram of said audio sample.

12. (Currently amended) The method of claim 11 wherein salient points of said spectrogram comprise time coordinates and frequency coordinates, and wherein said ~~particular locations~~ sample landmarks are computed from said time coordinates, and said sample fingerprints are computed from said frequency coordinates.

13. (Currently amended) The method of claim 12, further comprising linking ~~a plurality~~ at least one of said salient points to an anchor salient point, wherein one of said ~~particular locations~~ sample landmarks is computed from a time coordinate of said anchor salient point, and a corresponding fingerprint is computed from frequency coordinates of at least one of said linked salient points and said anchor point.

14. (Original) The method of claim 13, wherein said linked salient points fall within a target zone.

15. (Original) The method of claim 14, wherein said target zone is defined by a time range.

16. (Original) The method of claim 14, wherein said target zone is defined by a frequency range.

17. (Original) The method of claim 14, wherein said target zone is variable.

18. (Original) The method of claim 13 wherein said corresponding fingerprint is computed from a quotient between two of said frequency coordinates of said linked salient points and said anchor point, whereby said corresponding fingerprint is time-stretch invariant.

19. (Original) The method of claim 13 wherein said corresponding fingerprint is further computed from at least one time difference between said time coordinate of said anchor point and said time coordinates of said linked salient points.

20. (Original) The method of claim 19, wherein said corresponding fingerprint is further computed from a product of one of said time differences and one of said frequency coordinates of said linked salient points and said anchor point, whereby said corresponding fingerprint is time-stretch invariant.

21. (Currently amended) The method of claim 6 wherein said ~~particular locations~~ sample landmarks and said sample fingerprints are computed from salient points of a multidimensional function of said audio sample, wherein at least one of said dimensions is a time dimension and at least one of said dimensions is a non-time dimension.

22. (Currently amended) The method of claim 21 wherein said ~~particular locations~~ sample landmarks are computed from said time dimensions.

23. (Original) The method of claim 21 wherein said sample fingerprints are computed from at least one of said non-time dimensions.

24. (Original) The method of claim 21 wherein said salient points are selected from the group consisting of local maxima, local minima, and zero crossings of said multidimensional function.

25. (Original) The method of claim 6 wherein said sample fingerprints are time-stretch invariant.

26. (Original) The method of claim 6 wherein each sample fingerprint is computed from multiple timeslices of said audio sample.

27. (Original) The method of claim 26 wherein said multiple timeslices are offset by a variable amount of time.

28. (Original) The method of claim 27 wherein each fingerprint is computed in part from said variable amount.

29. (Currently amended) The method of claim 1 wherein said identifying step comprises locating a diagonal line within a scatter plot of said corresponding ~~locations~~ landmarks.

30. (Currently amended) The method of claim 29 wherein locating said diagonal line comprises forming differences between said corresponding ~~locations~~ landmarks.

31. (Original) The method of claim 30 wherein locating said diagonal line further comprises sorting said differences.

32. (Original) The method of claim 30 wherein locating said diagonal line further comprises calculating the peak of a histogram of said differences.

33. (Original) The method of claim 1 wherein said identifying step comprises computing one of a Hough transform and a Radon transform of said correspondences.

34. (Original) The method of claim 33 wherein said identifying step further comprises locating a peak of said Hough transform.

35. (Currently amended) The method of claim 1 wherein said identifying step comprises determining whether ~~said the~~ a number of said correspondences exceeds a threshold value.

36. (Currently amended) The method of claim 1 further comprising:

obtaining from a database index additional fingerprints characterizing file locations of additional media ~~files~~ entities to be identified;

generating additional correspondences between said ~~particular locations of said media~~ sample landmarks and ~~said~~ file ~~locations~~ landmarks of said additional media ~~files~~ entities, wherein corresponding ~~locations~~ landmarks have equivalent fingerprints; and

identifying media ~~files~~ entities for which a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related.

37. (Currently amended) The method of claim 36 further comprising selecting a winning media ~~file~~ entity from said identified media ~~files~~ entities, wherein said winning media ~~file~~ entity has a largest plurality of substantially linearly related corresponding ~~locations~~ landmarks.

38. (Currently amended) The method of claim 36 wherein the step of identifying said media ~~files~~ entities for which a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related further comprises searching a first subset of said additional media ~~files~~ entities.

39. (Currently amended) The method of claim 38 wherein additional media ~~files~~ entities in said first subset have a higher probability of being identified than additional media ~~files~~ entities that are not in said first subset.

40. (Original) The method of claim 39 wherein said probability of being identified is computed in dependence on a recency of previous identification.

41. (Original) The method of claim 39 wherein said probability of being identified is computed in dependence on a frequency of previous identification.

42. (Currently amended) The method of claim 38 wherein the step of identifying said media ~~files~~ entities for which a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related further comprises searching a second subset of said additional media ~~files~~ entities, wherein ~~said second subset is searched if~~ no media ~~files~~ entities in said first subset are identified.

43. (Currently amended) The method of claim 36, further comprising ranking said additional media ~~files~~ entities according to a probability of being identified.

44. (Original) The method of claim 43 wherein said probability is computed in part in dependence on a recency of previous identification.

45. (Currently amended) The method of claim 44 wherein said probability is computed in part by increasing a recency score of a particular media ~~file~~ entity when said particular media ~~file~~ entity is identified.

46. (Currently amended) The method of claim 44 wherein said probability is computed in part by decreasing recency scores of said additional media ~~files~~ entities at regular time intervals.

47. (Original) The method of claim 46 wherein said recency scores are decreased exponentially in time.

48. (Currently amended) The method of claim 43 wherein the step of identifying said media ~~files~~ entities for which a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related further comprises searching said additional media ~~files~~ entities according to said ranking.

49. (Currently amended) The method of claim 36 wherein the step of identifying said media ~~files~~ entities for which a plurality of said corresponding ~~locations~~ landmarks are

substantially linearly related further comprises terminating said search at a media ~~file~~ entity having a number of said substantially linearly related corresponding ~~locations~~ landmarks that exceeds a predetermined threshold.

50. (Original) The method of claim 1 wherein said method is implemented in a distributed system.

51. (Original) The method of claim 50 wherein said computing step is performed in a client device, said obtaining, generating, and identifying steps are performed in a central location, and the method further comprises transmitting said sample fingerprints from said client device to said central location.

52. (Currently amended) The method of claim 1, further comprising repeating said computing, obtaining, generating, and identifying steps for sequentially growing ~~segments~~ size of said media sample.

53. (Currently amended) The method of claim 1 ~~wherein~~, further comprising performing said obtaining, generating, and identifying steps ~~are performed~~ at periodic intervals on a rolling buffer storing said computed sample fingerprints.

54. (Currently amended) The method of claim 1, further comprising obtaining said media sample~~, wherein~~ and simultaneously performing said computing step ~~and said obtaining step are performed simultaneously~~.

55. (Currently amended) A method for ~~comparing~~ recognizing a media entity from a media sample ~~and a media file~~, comprising:

receiving a set of sample fingerprints, each sample fingerprint characterizing a particular ~~location~~ sample landmark within said media sample;

obtaining a set of file fingerprints, each file fingerprint characterizing ~~at least one~~ a particular file ~~location~~ landmark within ~~said~~ a media ~~file~~ entity to be identified;

generating correspondences between said ~~particular locations of said media~~ sample landmarks and said obtained file ~~locations of said media files~~ landmarks, wherein corresponding ~~locations~~ landmarks have equivalent fingerprints; and

identifying said media ~~sample and said media file~~ entity if a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related.

56. (Currently amended) A method for recognizing a media sample, comprising:

continually sampling into a sound buffer N seconds of said media sample;

computing a set of sample fingerprints characterizing a segment of said media sample stored in said sound buffer, wherein said segment has one or more distinct landmarks occurring at reproducible locations of said media sample;

storing said fingerprints in a rolling buffer;

obtaining a set of matching fingerprints in a database index, each matching fingerprint characterizing at least one distinct landmark of a media file and ~~matching~~ is equivalent to at least one fingerprint in said rolling buffer;

identifying at least one media file having a plurality of matching fingerprints;

reporting presence of said at least one media file; and

removing at least one sample fingerprint from said rolling buffer.

57. (Original) The method of claim 56, further comprising repeating said method for additional segments of said media sample.

58. (Original) The method of claim 56 wherein said computing, storing, and removing steps are performed in a client device and said locating and identifying steps are performed in a central location, and wherein the method further comprises transmitting said sample fingerprints from said client device to said central location.

59. (Original) The method of claim 56 wherein said computing step is performed in a client device and said storing, locating, identifying, and removing steps are performed in a central location, and wherein the method further comprises transmitting said fingerprints from said client device to said central location.

60. (Currently amended) A computer system programmed to perform the method steps of claim 1 ~~for characterizing an audio sample, comprising:~~

~~computing a set of reproducible locations in said audio sample; and~~

~~computing a set of fingerprints characterizing said reproducible locations in said audio sample~~.

61. (Currently amended) The method of claim ~~60~~56, wherein said reproducible locations and said sample fingerprints are computed simultaneously.

62. (Currently amended) A program storage device accessible by a computer, tangibly embodying a program of instructions executable by said computer to perform method steps for ~~comparing~~ recognizing a media entity from a media sample ~~and a media file~~, said ~~method steps~~ program of instructions comprising:

code for computing a set of sample fingerprints, each sample fingerprint characterizing a particular ~~location~~ sample landmark within said media sample;

code for obtaining a set of file fingerprints, each file fingerprint characterizing ~~at least one~~ a particular file ~~location~~ landmark within ~~said~~ a media ~~file~~ entity to be identified;

code for generating correspondences between said ~~particular locations of said media~~ sample landmarks and said obtained file ~~locations of said media file~~ landmarks, wherein corresponding ~~locations~~ landmarks have equivalent fingerprints; and

code for identifying said media ~~sample and said media file~~ entity if a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related.

63. (Currently amended) A system for recognizing a media entity from a media sample, comprising:

a landmarking and fingerprinting object for computing a set of particular ~~locations~~ sample landmarks within said media sample and a set of sample fingerprints, each sample fingerprint characterizing one of said particular ~~locations~~ sample landmarks;

a database index containing file ~~locations~~ landmarks and corresponding file fingerprints for at least one media ~~file~~ entity to be identified; and

an analysis object for:

locating a set of matching fingerprints in said database index, wherein said matching fingerprints are equivalent to said sample fingerprints;

generating correspondences between said ~~particular locations of said media~~ sample landmarks and said file ~~locations of said at least one media file~~ landmarks, wherein corresponding ~~locations~~ landmarks have equivalent fingerprints; and

identifying at least one media ~~file~~ entity for which a plurality of said corresponding ~~locations~~ landmarks are substantially linearly related.

64. (Currently amended) A computer-implemented method for recognizing an audio sample, comprising:

creating a database index of at least one audio file in a database, comprising:

computing ~~a set of fingerprints representing features of~~ landmarks and fingerprints for each audio file, ~~each~~ wherein each landmark occurs at a particular location within said audio file and is associated with a fingerprint ~~characterizing a particular location within said audio file~~;

associating, for each audio file, said landmarks and fingerprints with an identifier; and

storing ~~within a memory~~ said fingerprints, said ~~locations~~ landmarks, and ~~an~~ said identifier ~~of each media file, wherein each corresponding fingerprint, location and identifier is associated~~ in ~~said~~ a memory.

65. (Original) The method of claim 64, further comprising sorting said database index by fingerprint value.

66. (Original) The method of claim 64 wherein said particular locations of each audio file are computed in dependence on said audio file.

67. (Original) The method of claim 64 wherein each fingerprint represents at least one feature of said audio file near said particular location.

68. (Original) The method of claim 64 wherein said fingerprints are numerical values.

69. (Original) The method of claim 64 wherein values of said fingerprints specify a method for computing said fingerprints.

70. (Original) The method of claim 64 wherein said particular locations are timepoints within said audio file.

71. (Original) The method of claim 70 wherein said timepoints occur at local maxima of spectral Lp norms of said audio file.

72. (Original) The method of claim 64 wherein said fingerprints are computed from a frequency analysis of said audio file.

73. (Original) The method of claim 64 wherein said fingerprints are selected from the group consisting of spectral slice fingerprints, LPC coefficients, and cepstral coefficients.

74. (Original) The method of claim 64 wherein said fingerprints are computed from a spectrogram of said audio file.

75. (Original) The method of claim 74 wherein salient points of said spectrogram comprise time coordinates and frequency coordinates, and wherein said particular locations are computed from said time coordinates, and said fingerprints are computed from said frequency coordinates.

76. (Currently amended) The method of claim 75, further comprising linking ~~a plurality~~ at least one of said salient points to an anchor salient point, wherein one of said particular locations is computed from a time coordinate of said anchor salient point, and a corresponding fingerprint is computed from frequency coordinates of at least one of said linked salient points and said anchor point.

77. (Original) The method of claim 76, wherein said linked salient points fall within a target zone.

78. (Original) The method of claim 77, wherein said target zone is defined by a time range.

79. (Original) The method of claim 77, wherein said target zone is defined by a frequency range.

80. (Original) The method of claim 77, wherein said target zone is variable.

81. (Original) The method of claim 76, wherein said corresponding fingerprint is computed from a quotient between two of said frequency coordinates of said linked salient points and said anchor point, whereby said corresponding fingerprint is time-stretch invariant.

82. (Original) The method of claim 76, wherein said corresponding fingerprint is further computed from at least one time difference between said time coordinate of said anchor point and said time coordinates of said linked salient points.

83. (Original) The method of claim 82, wherein said corresponding fingerprint is further computed from a product of one of said time differences and one of said frequency coordinates of said linked salient points and said anchor point, whereby said corresponding fingerprint is time-stretch invariant.

84. (Original) The method of claim 64 wherein said particular locations and said fingerprints are computed from salient points of a multidimensional function of said audio file, wherein at least one of said dimensions is a time dimension and at least one of said dimensions is a non-time dimension.

85. (Original) The method of claim 84 wherein said particular locations are computed from said time dimensions.

86. (Original) The method of claim 84 wherein said fingerprints are computed from at least one of said non-time dimensions.

87. (Original) The method of claim 84 wherein said salient points are selected from the group consisting of local maxima, local minima, and zero crossings of said multidimensional function.

88. (Original) The method of claim 64 wherein said fingerprints are time-stretch invariant.

89. (Original) The method of claim 64 wherein each fingerprint is computed from multiple timeslices of said audio file.

90. (Original) The method of claim 89 wherein said multiple timeslices are offset by a variable amount of time.

91. (Original) The method of claim 90 wherein said fingerprints are computed in part from said variable amounts.

92. (Currently amended) A method for recognizing a media entity from a media sample, comprising:

~~for each of a plurality of media files, providing a file representation of said media file;~~

~~providing a sample representation of said media sample; and~~

~~identifying at least one similar file representation among said file representations,~~

~~wherein said similar file representation is similar to said sample representation, by searching said file representations, wherein said searching is performed in part in dependence on a probability of identification of said file representation~~

generating correspondences between landmarks of said media sample and corresponding landmarks of a media entity to be identified, wherein said landmarks of said media sample and said corresponding landmarks of said media entity have equivalent fingerprints; and

identifying said media sample and said media entity if a plurality of said correspondences have a linear relationship defined by

$$landmark^*_n = m*landmark_n + offset,$$

where

$landmark_n$ is a sample landmark,

$landmark^*_n$ is a file landmark that corresponds to $landmark_n$, and

m represents slope.

93-102. (Cancelled).

103. (Currently amended) A method for recognizing a media sample, comprising

identifying media files ~~for which locations of a substantial plurality of equivalent features of said media files and said media sample are~~ that have file landmarks that are substantially linearly related to sample landmarks of said media sample; wherein

said file landmarks and said sample landmarks have equivalent fingerprints; and wherein

said file landmarks and said sample landmarks have a linear correspondence defined by

$$landmark^*_n = m*landmark_n + offset,$$

where

$landmark_n$ is a sample landmark,

$landmark^*_n$ is a file landmark that corresponds to $landmark_n$, and

m represents slope.

104. (Currently amended) A method for comparing an audio sample and an audio ~~file~~ entity, comprising:

for each of at least one audio ~~file~~ entity to be identified, computing a plurality of ~~file~~ entity fingerprints representing said audio ~~file~~ entity; wherein each entity fingerprint characterizes one or more features of said audio entity at or near an entity landmark in at least one dimensions including time;

computing a plurality of sample fingerprints representing said audio sample, wherein said sample fingerprints are invariant to time stretching of said audio sample; and

identifying ~~said audio sample and said~~ a matching audio ~~file if~~ entity that has at least a threshold number of said file fingerprints that are equivalent to said sample fingerprints~~;~~

~~wherein said sample fingerprints are invariant to time stretching of said audio sample~~.

105. (Original) The method of claim 104 wherein said sample fingerprints comprise quotients of frequency components of said audio sample.

106. (Original) The method of claim 104 wherein said sample fingerprints comprise products of frequency components of said audio sample and time differences between points in said audio sample.

107. (Previously presented) A method of characterizing an audio sample, comprising computing at least one fingerprint from a spectrogram of said audio sample, wherein said spectrogram comprises an anchor salient point and linked salient points, and wherein said fingerprint is computed from frequency coordinates of said anchor salient point and at least one linked salient point.

108. (Previously presented) The method of claim 107, wherein said linked salient points fall within a target zone.

109. (Previously presented) The method of claim 108, wherein said target zone is defined by a time range.

110. (Previously presented) The method of claim 108, wherein said target zone is defined by a frequency range.

111. (Previously presented) The method of claim 108, wherein said target zone is variable.

112. (Previously presented) The method of claim 107 wherein said fingerprint is computed from a quotient between two of said frequency coordinates of said linked salient points and said anchor point, whereby said fingerprint is time-stretch invariant.

113. (Previously presented) The method of claim 107 wherein said fingerprint is further computed from at least one time difference between said time coordinate of said anchor point and said time coordinates of said linked salient points.

114. (Previously presented) The method of claim 113, wherein said fingerprint is further computed from a product of one of said time differences and one of said frequency coordinates of said linked salient points and said anchor point, whereby said fingerprint is time-stretch invariant.

115. (Previously presented) The method of claim 107 wherein said anchor salient point and said linked salient points are selected from the group consisting of local maxima, local minima, and zero crossings of said spectrogram.

116. (Currently amended) A method for comparing an audio sample and an audio ~~file~~ entity, comprising:

for each of at least one audio ~~file~~ entity to be identified, computing a plurality of ~~file fingerprints~~ entity landmark/fingerprint pairs representing said audio ~~file~~ entity, wherein each landmark occurs at a particular location within said audio entity in at least one dimension including time, and wherein each fingerprint characterizes one or more features of said audio entity at or near said particular location;

computing a plurality of sample ~~fingerprints~~ landmark/fingerprint pairs representing said audio sample by

obtaining time and frequency coordinates of at least one salient point of a spectrogram of said audio sample, wherein each salient point serves as an anchor point defining a sample landmark; and

generating at least one multidimensional sample landmark/fingerprint pair from said at least one salient point, wherein sample landmarks of said audio sample

are taken to be time coordinates and wherein corresponding sample fingerprints are computed from at least one of the remaining coordinates; and

identifying ~~said audio sample and said~~ a winning audio ~~file if~~ entity that has at least a threshold number of said file fingerprints that are equivalent to said sample fingerprints~~;~~

~~wherein each sample fingerprint is computed from a spectrogram of said audio sample, wherein said spectrogram comprises an anchor salient point and linked salient points, and wherein said sample fingerprint is computed from frequency coordinates of said anchor salient point and at least one linked salient point~~.

117. (Previously presented) The method of claim 116, wherein said linked salient points fall within a target zone.

118. (Previously presented) The method of claim 117, wherein said target zone is defined by a time range.

119. (Previously presented) The method of claim 117, wherein said target zone is defined by a frequency range.

120. (Previously presented) The method of claim 117, wherein said target zone is variable.

121. (Previously presented) The method of claim 116 wherein said sample fingerprint is computed from a quotient between two of said frequency coordinates of said linked salient points and said anchor point, whereby said sample fingerprint is time-stretch invariant.

122. (Previously presented) The method of claim 116 wherein said sample fingerprint is further computed from at least one time difference between said time coordinate of said anchor point and said time coordinates of said linked salient points.

123. (Previously presented) The method of claim 122, wherein said sample fingerprint is further computed from a product of one of said time differences and one of said frequency

coordinates of said linked salient points and said anchor point, whereby said sample fingerprint is time-stretch invariant.

124. (Previously presented) The method of claim 116 wherein said anchor salient point and said linked salient points are selected from the group consisting of local maxima, local minima, and zero crossings of said spectrogram.